

Application No. 10/710,257

Reply to Office Action of March 29, 2006

Amendments to and Listing of the Claims:

Please amend claims 1 and 9 as indicated below, wherein strikethrough indicates deletion and underlining indicates addition. This listing of claims will replace all prior versions and listings of claims in the application.

1. (Currently amended) A method of forming a PFET device comprising the steps:
providing a substrate having at least one gate stack having first and second
sidewalls;
depositing a silicon nitride layer by means of a dual-frequency plasma enhanced
CVD process, the CVD process comprising a temperature in the range 400° C to 550° C;
forming ~~a spacer on said at least one gate stack~~ from said silicon nitride layer first
and second separate, unconnected sidewall spacers, the first sidewall spacer extending along at
least a portion of the first sidewall and the second spacer extending along at least a portion of the
second sidewall; and
forming a PFET device comprising said at least one gate stack having said spacer.
2. (Original) The method of claim 1 wherein said dual-frequency plasma enhanced CVD
process further comprises a pressure in the range 2 Torr to 5 Torr.
3. (Original) The method of claim 1 wherein said dual-frequency plasma enhanced CVD
process further comprises a low frequency power in the range 0 W to 50 W.
4. (Original) The method of claim 1 wherein said dual-frequency plasma enhanced CVD
process further comprises a high frequency power in the range 90 W to 110 W.
5. (Original) The method of claim 1 wherein said dual-frequency plasma enhanced CVD
process further comprises precursor gases of silane, ammonia and nitrogen at flow rates in the
ratio 240:3200:4000 sccm.
6. (Original) The method of claim 1 wherein said dual-frequency plasma enhanced CVD

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process further comprises a temperature of 480° C.

7. (Original) The method of claim 1 wherein said dual-frequency plasma enhanced CVD process further comprises a pressure of 2.5 Torr.

8. (Original) The method of claim 1 wherein said dual-frequency plasma enhanced CVD process further comprises a high frequency power of about 100 W and a low frequency power of about 40 W.

9. (Currently amended) A method of forming a PFET device comprising the steps:
providing a substrate having at least one gate stack having first and second sidewalls;

depositing a silicon nitride layer by means of a dual-frequency plasma enhanced CVD process, the CVD process comprising a temperature in the range 400° C to 550° C, a pressure in the range 2 Torr to 5 Torr, a low frequency power in the range 0 W to 50 W, a high frequency power in the range 90 W to 110 W, and precursor gases of silane, ammonia and nitrogen at flow rates in the ratio about 240:3200:4000 sccm;

~~forming a spacer on said at least one gate stack~~ from said silicon nitride layer first and second separate, unconnected sidewall spacers, the first sidewall spacer extending along at least a portion of the first sidewall and the second spacer extending along at least a portion of the second sidewall; and

forming a PFET device comprising said at least one gate stack having said spacer.

10. (Original) The method of claim 9 wherein the CVD process comprises a temperature about 480° C, a pressure of about 2.5 Torr, a low frequency power of about 40 W, a high frequency power of about 100 W, and precursor gases of silane, ammonia and nitrogen at flow rates in the ratio about 240:3200:4000 sccm.

11. (Withdrawn) A silicon nitride film for forming a semiconductor device having a spacer, said silicon nitride film formed by a dual-frequency PECVD process comprising a temperature in

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the range 400° C to 550° C, wherein said silicon nitride film has a vertical to horizontal coverage ratio between 70% to 90%.

12. (Withdrawn) The silicon nitride film of claim 11 further comprising RBS Si, N, H ratios of 0.4:0.48:0.12.

13. (Withdrawn) The silicon nitride film of claim 11 further comprising a FTIR ratio of Si-H/N-H of about 0.1.

14. (Withdrawn) The silicon nitride film of claim 11 further comprising percent bonded hydrogen less than 10% by volume.

15. (Withdrawn) The silicon nitride film of claim 11 further comprising a refractive index of 1.95 ± 0.05 .

16. (Withdrawn) The silicon nitride film of claim 11 wherein said silicon nitride film has a deposited stress in the range from about +8 Gigadynes/cm² tensile stress to -7 Gigadynes/cm² compressive stress.

17. (Withdrawn) The silicon nitride film of claim 11 wherein said silicon nitride film has a deposited stress of about 3 Gigadynes/cm² compressive stress.

18. (Withdrawn) A semiconductor device having a spacer, wherein said spacer comprises a silicon nitride film formed by a dual-frequency PECVD process comprising a temperature in the range 400° C to 550° C, wherein said silicon nitride film has a vertical to horizontal coverage ratio between 70% to 90%.

19. (Withdrawn) The semiconductor device of claim 18 wherein said semiconductor device is a PFET device.

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20. (Withdrawn) The semiconductor device of claim 19 where in said spacer comprises a dual spacer.